None of the biochemical techniques for characterization that are currently available for Leishmania can give a rapid answer to the identity of the parasite. All the methods require the use of a large amount of parasite material which must be obtained by *in vitro* cultivation, and sometimes the isolation and growth of the organisms can take several weeks. If monoclonal antibody techniques live up to their promise, it may be possible in the future to identify the oranisms in a smear taken directly from the patient. Developments in this field are eagerly awaited.

W Peters
D A Evans
Sheila M Lanham
Department of Medical Protozoology
London School of Hygiene and Tropical Medicine

Acknowledgments: We wish to thank Colonel D Sim-Davis and Major D S Jolliffe of the Royal Army Medical Corps for access to their patients, and Dr W A D Griffiths of the Institute of Dermatology for his clinical help and for the provision of examination facilities. This work received financial support from The Wellcome Trust and from the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases.

References

Chance M L
(1979) *Symposia of the British Society for Parasitology* **17,** 55–73
Chance M L & Walton B C *(eds)*
(1982) Biochemical characterization of Leishmania. UNDP/World Bank/WHO special programme for research and training in tropical diseases, Geneva (July)
Lainson R & Strangways-Dixon J
(1963) *Transactions of the Royal Society of Tropical Medicine and Hygiene* **57,** 242–265
Peters W
(1981) In: Parasitological Topics. Ed. E U Canning. Society of Protozoologists Special Publication No. 1, Lawrence, Kansas
Pratt D M & David J R
(1981) *Nature* **291,** 581–583
Rioux J-A, Lanotte G, Maazoun R, Perello R & Pratlong F
(1980) *Comptes Rendus hebdomadaires des séances de l'Académie des Sciences Paris Série D* **291,** 701–703
Schnur L F, Chance M L, Ebert F, Thomas S C & Peters W
(1981) *Annals of Tropical Medicine and Parasitology* **75,** 131–144
United Nations Development Programme/World Bank/World Health Organization
(1980) Third Annual Report: special programme for research and training in tropical diseases. UNDP/World Bank/WHO, Geneva

Auditory experiences of deaf schizophrenics[1]

'Who is so deaf that he will not hear?'
John Heywood, Proverbs 1546

Our understanding of the thought processes of profoundly deaf people who are born deaf or become deaf before the stage of linguistic learning is limited (Furth 1966); and this is also true of their hallucinatory experiences. Although we are aware that many people with acquired deafness complain of disabling whistling, hissing or buzzing, it is not possible to ask a prelingually deaf person whether he experiences tinnitus – the concept cannot be explained. What is known from the observations of Basilier (1973), Critchley *et al.* (1981) and others is that if a profoundly, prelingually deaf person develops schizophrenia later in life, he may have 'auditory' hallucinatory experiences and that these experiences simulate every form of auditory hallucination described by Schneider (1959) in his first rank symptoms of schizophrenia. Despite the fact that Basilier (1973) considered that 'auditory' conveyed no more than 'receiving meaningful information', these experiences are of considerable scientific interest and deserve a more open interpretation because the descriptions used by deaf patients to describe these phenomena appear to involve modes of communication outside their normal experience. Thus, whilst it is necessary to exercise caution in accepting the experiences as auditory, it is also advisable not to dismiss as necessarily artificial the frequent use of auditory terminology in their explanation. If we

[1]Based on paper read to joint meeting of the Sections of Neurology and Psychiatry, 2 December 1982

0141–0768/83/070542–03/$01.00/0

can accept these experiences as genuine, it follows that they reinforce the concept of a nuclear form of schizophrenia, especially as it has been shown from epidemiological studies and the comparative incidence among siblings of index cases that the frequency of schizophrenia among the deaf is essentially similar to that found in the hearing population (Mendlewicz 1980).

The frequency of hallucinatory experiences among profoundly, prelingually deaf schizophrenics differs subtly from those of their hearing contemporaries. Critchley *et al.* (1981) found that the frequency of haptic hallucinations, passivity phenomena and delusions often of a paranoid type was similar. Visual hallucinations, which are rare among hearing schizophrenics (2–4%, *see* Feinberg 1962), occurred in 10 out of 12 patients: some of the experiences were classical scenic hallucinations, but others are more accurately described as visuo-verbal hallucinations, as though the visual picture had been substituted for a verbal commentary. Non-auditory modes of communication familiar to profoundly deaf people, such as writing on the wall and sign language, were described among the hallucinatory experiences of 3 patients but invariably in association with 'auditory' experiences which were described by 10 out of 12 patients. Voiced experiences, whether presenting as a running commentary on the subject's thoughts or behaviour, as voices in discussion or as specific instructions addressed to the patient, differed widely in their clarity.

Before the possible significance of auditory hallucinations among deaf schizophrenics can be discussed further, certain caveats must be considered in detail. Firstly, hallucinations in schizophrenia differ intrinsically from classical hallucinations, being neither mental images nor true perceptions but liable to distortion by delusional systematization. Thus a relationship may be made without adequate proof in a bizarre delusional context. The information may be correctly schematized, but the schema shift their interrelationships thus forcing the subject to develop a complex and interlocking argument (Reed 1972). Gould (1949), Green & Preston (1981) and others have shown that auditory hallucinations in schizophrenia are accompanied by activation of the muscles of phonation, reflected in most cases by electromyographic activity and in some by actual subvocal speech. Hearing schizophrenics describe their hallucinations as anything from vague mumblings to distinct speech usually addressed to the patient in the third person. Secondly, the major problem in accepting the possible auditory nature of the hallucinations of deaf schizophrenics is not psychiatric but linguistic. The language ability of the majority of profoundly, prelingually deaf people is limited. The process of education, even with augmentation by a hearing aid, demands ideal conditions, much reinforcement and constant repetition. Simple concepts such as 'in, on, up, under' are grasped with difficulty; vocabulary acquisition is tedious; and when lip-reading it is still necessary to guess nine out of ten words (Sutcliffe 1964). Most schools discourage sign language or finger spelling and, although this trend is being reversed, ease of communication through sign language is bedevilled by the fact that the syntax is rudimentary and the grammatical structure is totally different from normal speech (Klima & Bellugi 1979). Such communication skills as a deaf adult is able to retain may atrophy through lack of encouragement and, especially if he has a psychiatric problem, he is recognized as an isolate with whom it is difficult to establish a mutual method of communication.

Offset against these considerations, which demand circumspection, are a number of factors that support acceptance of the reality of their experiences. Man has had the capacity for hearing and vocalization for thousands of years. Damage to the peripheral hearing organ does not inevitably mean disruption of the central pathways and nearly all profoundly deaf people retain some residual hearing: thus pure tone audiography may show that whereas only occasional speech syllables may be incompletely heard, such a person is probably not entirely devoid of auditory experience. The speech audiogram occupies only part of the wider range of appreciation of musical and other sounds; thus a person incapable of hearing human speech may have experienced the sound of a horse trotting, a clap of thunder, a bell chiming or even a dog barking.

In our study we were particularly careful not to accept auditory descriptions at their face value without further questioning; but of far greater consequence was the insistence of the deaf patients themselves that the communicated experiences did not involve speech reading or sign language (Critchley *et al.* 1981). When pressed for an explanation, only one admitted that she did not know how she could hear voices, another said that it was 'queer talk – not signs', and others were adamant that they had heard and not lip-read the experience – finger spelling the word 'heard' with great emphasis. In those who experienced both vocal and non-vocal communication there appeared to be a primacy of

auditory communication: thus God spake but St Theresa signed to the same patient.

Using the analogy of epileptic auditory hallucinations (Currie *et al.* 1971), it may be that the specific hallucinations of nuclear schizophrenia, in both hearing and deaf schizophrenics, are chemically excited in the region of the dominant temporal lobe. Throughout man's evolution, language has been forged on a vocal-auditory system intimately connected with thought processes, and the deaf person is not exempted from this development. Thus Neville (1977) was able to demonstrate that a deaf child learning to communicate through gestures shows no clear cerebral dominancy; but if sign language is learnt, even though the means of communication are visual, the left hemisphere becomes dominant – presumably reflecting the linguistic nature of the task.

E M R Critchley
Consultant Neurologist
Preston Infirmary
Preston
Lancashire

References

Basilier T
(1973) Hørselstep og egentlig døvhet. Universitetsforlager, Oslo
Critchley E M R, Denmark J C, Warren F & Wilson K A
(1981) *British Journal of Psychiatry* **138,** 30–32
Currie S, Heathfield K W G, Henson R A & Scott D F
(1971) *Brain* **94,** 173–176
Feinberg I
(1962) In: Hallucinations. Ed. L J West. Grune & Stratton, New York; chapter 5
Furth R G
(1966) In: Psychological Implications of Deafness. Macmillan, London
Gould L N
(1949) *Journal of Nervous and Mental Diseases* **109,** 418–427
Green P & Preston P
(1981) *British Journal of Psychiatry* **139,** 204–208
Klima E & Bellugi U
(1979) The Signs of Language. Harvard University Press, London and New York
Mendlewicz J
(1980) In: Handbook of Biological Psychiatry, Part III. Ed. H M van Praag *et al.* Dekker, New York; pp 81–100
Neville H
(1977) *Brain and Language* **10,** 121–131
Reed G
(1972) The Psychology of Anomalous Experience. Hutchinson University Library, London
Schneider K
(1959) Clinical Psychology (English translation by M W Hamilton). Grune & Stratton, New York
Sutcliffe T H
(1964) Conversation with the Deaf. Royal National Institute for the Deaf, London